xanthophyll and that, while white leghorns fed continuously on a carotinoid-free diet from birth, lay colorless eggs and are all but entirely devoid of pigment, the color rapidly appears upon administration of a carotinoid diet. To demonstrate the relation of carotinoid pigment feeding to nerve cell lipochrome, twelve chickens were studied. Six were made carotinoid-free, and six carotinoid-full, while in three of each group, the factor of depression was introduced by producing beriberi, exposing to a temperature of 40° to 45° C., or administering morphin or phosphorus. Those chickens which received a carotinoid-containing diet showed the presence of yellow pigment. No lipochrome could be found in the nerve cells of the carotinoid-free chickens. The lipochrome was most abundant in the depressed group. As with melanin, the greatest quantity was found in the Gasserian and spinal ganglia. The identity of the microchemical reaction of the lipochrome consisted in the ferric-chloride test which oxidizes the pigment and becomes reduced to ferrous chloride, so that the oxidized pigment loses its color and the red ferric chloride changes to a vivid green. Lipochromes and lipins may be mistaken for one another or may occur in combination. The identification of lipochrome with carotinoid permits of positive deductions, as there is no more fat-holding pigment than there is pigment-holding fat. Melanin can be separated microchemically from lipochrome by the application of fat solvents, hydrogen peroxide, ferric-chloride, silver nitrate or Nile blue. The authors believe that their results contradict Lubarsch's conception that the fat-holding pigment is a "wear and tear" pigment in nerve cells, pointing out that the so-called metabolic pigment is, in reality, an exogenous one. Melanin, on the other hand, may be conceived, under certain conditions, as an abnormal "wear and tear" pigment, being governed by extracellular agencies.

The Sterilization of Lipovaccines.—The substitution of oil for saline solution as a vehicle for bacterial vaccines to immunize against typhoid fever and pneumonia offers distinct theoretical advantages and has recently been rather extensively employed. Unfortunately, certain methods of preparation have not proved wholly satisfactory in that the dependability of the final sterilization has been problematical. Utilizing the results of Loeffler's work, that dry heat will kill bacteria without destroying their antigenic properties, LEWIS and DODGE (*Jour. Exp. Med.*, 1920, xxxi, 169) sterilized pneumococcus and typhoid lipovaccines by heating to 130° C. for three hours or to 120° C. for twelve hours in an electric oven. The pneumococcus lipovaccine was prepared according to the method of Whitmore and Fennel. Control cultures of the unheated vaccine yielded Bacillus subtilis and other organisms in the majority of instances. It was shown that Bacillus subtilis will remain viable in unheated lipovaccine containing chloretone for months. Both the heated and unheated lipovaccine was administered, subcutaneously in a dose of 0.5 c.c. to healthy mice, and, after varying periods, the resistance of these mice was tested by intraperitoneal injections of multiple lethal doses of pneumococci. It was found that the heat did not decrease the antigenic qualities of the lipovaccine appreciably; that the protection afforded was at least ten times the fatal dose and that the optimum period was thirty-five to thirty-eight days after the prophylactic dose. No protection was gained at twenty-one, fifty-six or one

hundred and ten days, from which the authors concluded that the immunity following a single dose of the pneumococci lipovaccine is slow to develop and transient. Typhoid lipovaccine, similarly heated and unheated, was given to rabbits, intraperitoneally, in a single dose of 1 c.c. The comparison of the agglutinin content of the blood of these rabbits with those receiving three doses of typhoid vaccine in saline solution demonstrated that the antigenic properties of the particular lipovaccine employed was almost destroyed by heating to 130° C. for three hours.

Pfeiffer's Bacillus and Influenza.—Wollstein (*Jour. Exper. Med.*, 1919, xxx, 555) presents results of a serological study during the recent epidemic. Pfeiffer bacilli were grown on a rabbit's blood agar, blood broth and oleate agar. For serological study, convalescent patient's sera and monovalent immune sera produced in rabbits, were used. Spontaneous clumping of the Pfeiffer bacilli rendered agglutination reaction rather unsatisfactory. The reactions showed a great variation and were inconclusive. Active antigens for complement-fixation reactions were obtained from blood broth cultures of the organisms. Complement-binding bodies were absent from the blood of four normal individuals. Fixation antibodies were present in the blood of influenza patients at the end of the first week, increasing in strength during the second week and had disappeared from the blood stream between the third and fourth month. A complicating pneumonia increased the complement-binding power of the serum. Fixation antibodies were found in immune rabbit sera. Precipitin reactions paralleled the complement-binding phenomena. Two or three c.c. of the filtrates from seven strains of Pfeiffer bacilli, injected intravenously killed rabbits in one or two and one-half hours. The filtrates from other strains were much less lethal. Protection experiments on mice, using sera of rabbits which had been injected with poisonous filtrates were unsatisfactory. Convalescent human sera gave no protection.

Grouping of Bacillus Influenzæ by Specific Agglutination.—The results of immunologic reactions on strains of hemophilic organisms, particularly B. influenzæ, have varied widely. Some investigators have failed to demonstrate immune bodies, others have established specific agglutination with the homologous serum of a given strain and still others have indicated almost complete absorption of agglutination for both the immunizing and heterologous strains. Small and Dickson (*Jour. Infect. Dis.*, 1920, xxvi, 230) were able by agglutination and absorption tests to place seven of ten strains of B. influenzæ into two groups. Three fell into group I, four into group II, while groups III and IV contained one strain each. The last strain did not correspond to the usual morphologic characters of B. influenzæ in that it was very pleomorphic. It was not grouped but was most closely related to the members of group III. Immunization was performed on rabbits. The antigens consisted of saline suspensions from cooked blood-agar plates which had been inoculated with strains isolated from the nasopharynx and bronchi of the human. The agglutination tests showed some cross group agglutinins between group I and II and also between groups III and the unclassified strain and the two groups. The strain termed group IV appeared more strictly unrelated to the others.